

REMARKS

Claims 1 and 4-8 have been rejected by the Examiner under 35 USC 103(a) as being unpatentable over Zhang, U.S. Patent 5,757,392 in view of Yasutomi, JP 410235860A. Also, claim 3 has been rejected by the Examiner under 35 USC 103(a) as being unpatentable over Zhang and Yasutomi as applied to claim 1 and further in view of Niikawa, US Patent 4,866,326. These rejections are respectfully traversed.

The present invention is directed to a method and device for controlling an ink jet printhead containing a substantially closed duct in which ink is situated, said duct having at least one exit opening for the ink, which comprises setting a required pressure change for obtaining an ink drop ejection in which the drop has a previously known size and/or speed. Applying an actuation pulse to an electromechanical transducer so that the pressure in the duct changes, measuring the electrical impedance of the electromechanical transducer, real time, during the application of said pulse and real time adapting the same actuation pulse on the basis of the measuring impedance to obtain the said required pressure change, thus ejecting an ink drop having the previously known size and/or speed from the exit opening.

Zhang is directed to a piezoelectric type liquid droplet ejecting device which is adapted to compensate for residual pressure fluctuations. Thus, the control method taught by Zhang comprises negating the residual pressure fluctuations in ink drops by applying additional drive pulses that induce pressure waves opposite to the pressure wave created by the drop-forming pulse (actuation). In other words, an ink drop has already been ejected before the control action that negates the residual pressure fluctuation in the ink duct. This suggests that according to the teachings of Zhang, the drop size and/or drop speed can only be adjusted for subsequent droplets. In response to this argument suggested by the Applicants, the Examiner argues that because the claim language does not clearly define wherein only one ink drop is ejected due to the step of applying of the actuation pulse and the step of adapting the same actuation pulse, the claim language can be interpreted as that the applying of an actuation pulse causes an ejected ink drop and the step of adapting the same actuation pulse causes a subsequent ejected ink droplet having a previously known size or speed.

In an effort to respond to the Examiner's interpretation of the claims, and for purposes of clarification, claims 1 and 7 have been amended to clarify that the control action of the present invention controls at least one of the parameters of drop-size and/or speed of the momentarily formed droplet. Controlling the subsequent droplet, as described in the prior art, implies that the size and/or speed of the momentarily formed droplet deviates significantly from the set allowable range (otherwise no control action would be inflicted at all), so that outliers (that is, drop size and/or speed are outside the predetermined range) are created. In contrast therewith, the method and apparatus of the present invention prevents the size and/or speed of the momentarily formed droplet to cross the boundaries of the set allowable range. Thus, the creation of outliers will be drastically reduced. Thus, controlling the momentarily formed droplet instead of the subsequent droplet offers an even more constant print quality compared to the state of the art, represented by Zhang and Yasutomi, because the sizes and/or speeds of all droplets are controlled to a previously known value.

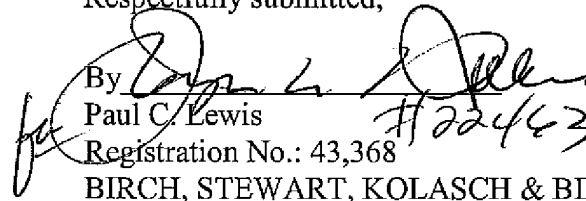
Accordingly, for all of the reasons previously stated in the Applicants' previous response to the Examiner's Office Action letter, it is believed that claims 1 and 7, as amended, clearly distinguish the present invention from the prior art relied upon by the Examiner, either alone or in combination. Accordingly, reconsideration of the rejections and allowance of all of the claims of the present application are respectfully requested. If, after reviewing the Applicants' proposed changes to claims 1 and 7, the Examiner feels that additional clarification is necessary with respect to the present invention, the Examiner is respectfully requested to contact the Applicants' attorney, Joseph A. Kolasch, Reg. No. 22,463, to discuss this matter.

Accordingly, action on the merits of the present Preliminary Amendment and allowance of all of the claims of the present application are respectfully requested.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37.C.F.R. §§1.16 or 1.14; particularly, extension of time fees.

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Respectfully submitted,

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